

REMARKS

Reconsideration is respectfully requested in view of Applicants' amendments and remarks herein.

The claims under consideration are claims 1-3 and 6-22 as original and amended claims, plus newly added claims 23-27.

The Examiner is respectfully requested to note the amendments made to generic claim 1.

In generic claim 1, the chromium precipitation accelerating agent brings about both of (a) the increase of pH of the chromate waste liquid to 9 or higher and maintenance of this increased pH and (b) the precipitation of a chromium component. Amended claim 1 is clearly supported by original claim 1, plus Examples 1 and 5 of the application as filed.

A second generic claim is added at this time, which is claim 25. In claim 25, step (a) of adding a specified chromium precipitation accelerating agent to chromate waste liquid and (b) of adding a basic pH adjusting agent to increase the pH to a first pH of 9 or higher for precipitating a chromium component, are carried out in sequence, as set forth in the claim.

Claim 25 is supported, for example, by original claims 4 and 5, page 7, lines 20-24, page 8, lines 27-32 and the sequence of Examples 2-4 of the application as filed.

With the above background in mind, Applicants now turn to a detailed consideration of the Office Action.

In paragraph 1 at the top of page 2 of the Office Action, claims 15 and 16 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite. The Examiner states that the

terminology "high molecular" is vague and indefinite because it is not clear how this term further limits the claims.

Claims 15 and 16 are directed to adding a high molecular coagulant to accelerate the precipitation of the chromium component. The Examiner is suggesting that the terminology "high molecular" is not needed in these claims, on the basis that the coagulants are well known materials.

The coagulant of claims 15 and 16 is the same as the flocculating agents discussed at page 14, line 32 to page 15, line 27 of the application. Therefore, "high molecular coagulant" in claims 15 and 16 now reads --flocculating agent--.

In view of the above, the 35 U.S.C. § 112 second paragraph rejection against claims 15 and 16 should be reconsidered and withdrawn.

In paragraph 3 beginning at the middle of page 2 of the Office Action, the Examiner rejects claims 1-6, 9, 10, 12-17 and 20-22 under 35 U.S.C. § 103(a) as being obvious to one of ordinary skill in the art over Cassidy et al. The Examiner considers that the use of calcium hydroxide to adjust pH in Cassidy et al. would inherently accelerate chromium precipitation as required by Applicants' claims.

Applicants' invention is directed to a process for treating a chromate waste liquid containing an organic acid component with a calcium and/or magnesium chromium precipitation accelerating agent with pH to be 9 or higher.

Cassidy et al is directed to an improvement in a process in which hexavalent chrome in the presence of a chelating agent for trivalent chromium is reduced to trivalent chromium and

then pH is adjusted to be from about 7.5 to about 10.0 by addition of an inorganic base to permit formation of chromic hydroxide, which is then removed from the solution. The inorganic base can be calcium hydroxide. However, in all the examples, sodium hydroxide appears to be used

The chelating agent can be various organic materials, including organic acids.

In Cassidy, et al., the pH is preferably from about 8.2 to 9.0; thus, there is no teaching or suggestion of a criticality with respect to a pH of 9 or higher. In addition, there is no suggestion or teaching in Cassidy that calcium hydroxide as opposed to sodium hydroxide might provide improved chromium precipitation in combination with the high pH of 9 or higher. There does not appear to be any reason what so ever from Cassidy et al. for motivation of the skilled artisan to select a particular pH and chromium precipitation accelerating agent in combination as used by Applicants. This is in reality a hindsight type rejection where the Examiner has attempted to develop a rejection after reviewing Applicants' disclosure and is attempting to read Applicants' invention into the prior art. We also note in passing that the pH in the Examples appear to always be below 9.0.

In fact, NaOH or KOH is much superior to Ca(OH)_2 as an inorganic base (a basic pH adjusting agent) for increasing pH (see page 8, lines 25-32; and page 10, line 27 to page 11, line 3 of the specification), since Ca(OH)_2 has a substantially lower solubility in water as compared with those of NaOH and KOH (see page 9, lines 16-18 of the specification and the attached three sheets of McGraw-Hill Dictionary of Chemistry (Second Edition, 2003)). Among these three hydroxides, the present inventors unexpectedly found that only Ca(OH)_2 is effective for both of (a) increasing the pH of the chromate waste liquid to 9 or higher and (b) precipitating a

chromium component from the chromate waste liquid, as clearly shown by Examples 1 and 5 of the specification. Thus, we strongly assert that Ca(OH)_2 is not a compound analogous to NaOH, KOH and NH_4OH of Cassidy et al. (see column 4, lines 52-55) as a chromium precipitation accelerating agent. This Ca(OH)_2 is specifically recited in claim 24.

Furthermore, in their comparative (comparison) Examples 9 and 10, Cassidy et al. respectively disclose the additions of a Mg component and a Ca component after the pH adjustment with NaOH. In contrast, according to the claimed invention of the amended claim 1, pH of the chromate waste liquid is increased to 9 or higher only by the addition of a calcium component and/or a magnesium component (i.e., the claimed chromium precipitation accelerating agent). In other words, NaOH and KOH of Cassidy et al. are clearly excluded from the claimed chromium precipitation accelerating agent of claim 1.

In addition to the above, the Examiner is also respectfully requested to note in column 7, first paragraph beneath the Table wherein Cassidy et al state that comparison examples 9 and 10 provided poor results as no improvement was seen relative to control example 11.

From the above, clearly the skilled artisan would not consider the use of a magnesium component or calcium component for addition to a chromate waste liquid for precipitating a chromium component therefrom at a pH of 9 or higher. Therefore, claim 1 and claims dependent thereon are clearly unobvious over Cassidy et al. Furthermore, with respect to claim 25, the order of sequence of steps (a) and then (b) is just the opposite of the procedure of comparison Examples 9 and 10 of Cassidy et al. In other words, according to comparison examples 9 and 10 of Cassidy et al., NaOH is added to increase pH of the waste liquid, and then the Mg or Ca

component is added. Considering the poor results obtained with this sequence, the subject matter of claim 25 could not possibly be suggested nor taught to the skilled artisan from Cassidy et al.

In paragraph 4 on page 3 of the Office Action, claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Cassidy et al., further in view of Kreisler.

In claim 7, the chromium precipitation accelerating agent is calcium chloride. The Examiner concludes that from column 5, line 21 through column 6, line 30 of Kreisler, it would be obvious to use calcium chloride in combination with calcium hydroxide to aid in precipitating and removing chromium from a waste stream.

First of all, Applicants submit that claim 7 is patentable for the same reasons why claim 1 is patentable because Cassidy is a deficient reference and does not teach nor suggest the basic process of claim 1. Moreover, note that Kreisler is concerned with a process set up to remove various metals from a waste stream, in which process a particular complexing agent is used to form metal ions of the metal to be recovered. Then, a particle growth enhancer which can be calcium chloride is added to promote the aggregation of the metal ions. At that point, the metal ions appear to be in solution since later dewatering and drying is carried out to form an ionic metal concentrate. In any event, there is no teaching or suggestion in Kreisler that calcium chloride would be a chromium precipitation accelerating agent. There is no connection between calcium chloride and chromium by Kreisler. Any type of particle growth enhancer, which can be calcium chloride, can be used with any metal ion recovery in Kreisler to follow the use of the metal complexing agent to form the metal ions. Clearly claim 7 is patentable.

In paragraph 5 which begins toward the bottom of page 3 of the Office Action, claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Cassidy et al. further in view of Leggett et al. The Examiner cites column 1, line 42 through column 2, line 60 of Leggett as teaching that it is known to add magnesium chloride to a waste stream containing chromium and chelating agent to aid in precipitation of the chromium. Claim 8 of the present invention is directed to the use of magnesium chloride as the chromium precipitation accelerating agent.

Leggett is directed to recovery of numerous metals including chromium in which ozonation of the waste steam is carried out to destroy metal chelates, thereby permitting precipitating of the metal. The improvement in this process is the addition of magnesium hydroxide (which can be prepared in situ by adding a salt such as magnesium chloride followed by an adjustment of pH) to aid in the adsorption of ozone and therefore speed up the chelate degradation process. pH during ozonation is said to be between about 8 and 9, even though formation of the magnesium hydroxide is said to occur at a pH of about 9.5 after addition of base to the magnesium chloride.

Leggett does not have anything what so ever to do with a process such as that described in the present claims. The magnesium hydroxide is used for an entirely different purpose in a different type of process. It does not seem that one skilled in the art would even consider combining Leggett's ozonation process with the process of Cassidy et al. Clearly, claim 8 is patentable.

In paragraph 6 of the Office Action, claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Cassidy et al. further in view of Gaughan et. al. In paragraph 7 of the

AMENDMENT UNDER 37 C.F.R. § 1.111
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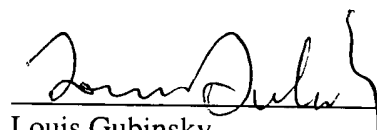
Office Action, claims 18 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cassidy et al. and Leggett et al. further in view of Heskett. Since neither Gaughan et al. nor Heskett are cited for nor provide the obvious deficiencies of the primary reference of Cassidy et al., clearly claims 11, 18 and 19 are patentable for the reasons discussed above with respect to Cassidy et al. alone.

Early indication of allowability is respectfully requested. If any minor points remain prior to notice of allowance, the Examiner is respectfully requested to contact the undersigned at the below listed phone number.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


Louis Gubinsky
Registration No. 24,835

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: September 17, 2003

cadmium nitrate [CHEM] $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ White, hygroscopic crystals, soluble in water, alcohol, and liquid ammonia; used to give a reddish-yellow luster to glass and porcelain ware. { 'kæd me am nī, nāt }

cadmium oxide [INORG CHEM] CdO In the cubic form, a brown, amorphous powder, insoluble in water, soluble in acids and ammonia salts; used for cadmium plating baths and in the manufacture of paint pigments. { 'kæd me am 'æks, æd }

cadmium potassium iodide See potassium tetraiodocadmiate. { 'kæd me am pō'tas-ē am 'i, æd }

cadmium sulfate [INORG CHEM] CdSO_4 A compound that forms colorless, efflorescent crystals, soluble in water; used as an antiseptic and astringent, in the treatment of syphilis, gonorrhea, and rheumatism, and as a detector of hydrogen sulfide and fumaric acid. { 'kæd me am 'sæl, fæt }

cadmium sulfide [INORG CHEM] CdS A compound with two forms: orange, insoluble in water, used as a pigment; and also known as orange cadmium; light yellow, hexagonal crystals, insoluble in water, and also known as cadmium yellow. { 'kæd me am 'sæl, fīd }

cadmium telluride [INORG CHEM] CdTe Brownish-black, cubic crystals with a melting point of 1090°C ; soluble with decomposition, in nitric acid; used for semiconductors. { 'kæd me am 'tel, yə, fīd }

cadmium tungstate [INORG CHEM] CdWO_4 White or yellow crystals or powder; soluble in ammonium hydroxide and alkali cyanides; used in fluorescent paint, x-ray screens, and scintillation counters. { 'kæd me am 'tʌŋ, stæt }

cadmate acid [ORG CHEM] $\text{C}_6\text{H}_4\text{O}_4$ A yellow crystalline acid that melts at $223-225^\circ\text{C}$ with decomposition; soluble in water and alcohol. { 'kæd me am 'æks, æd }

caffeine [ORG CHEM] $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$ An alkaloid found in a large number of plants, such as tea, coffee, cola, and mate. { 'kæf, en }

cage [PHYS CHEM] An aggregate of molecules in the condensed phase that surrounds fragments formed by thermal or photochemical dissociation or pairs of molecules in a solution that have collided without reacting. { 'kæd }

cage effect [PHYS CHEM] A phenomenon involving the dissociation of molecules unable to move apart rapidly because of the presence of other molecules, with the result that the dissociation products may recombine. { 'kæd, fekt }

cage hydrocarbon [ORG CHEM] A compound composed of only carbon and hydrogen atoms that contains three or more rings arranged topologically so as to enclose a volume of space. In general, the space within a cage hydrocarbon is too small to accommodate even a proton. { 'kæd, hī drī 'hæ, bən }

Caillé and Mathias law [PHYS CHEM] The law that describes the relationship between the mean density of a liquid and its saturated vapor at that temperature as being a linear function of the temperature. { 'kæ, 'mā, dī 'mæθiəs, lō }

calceolite See euclalyptol. { 'kæl, ē-pə, tōl }

calceolite See physostigmine. { 'kæl, ē-pə, tōl }

calced gypsum See plaster of paris. { 'kæl, sīnd 'līp-səm }

calcium [CHEM] A chemical element, symbol Ca, atomic number 20, atomic weight 40.08; used in metallurgy as an alloying agent for aluminum-bearing metal, as an aid in removing bismuth from lead, and as a deoxidizer in steel manufacture, and also used as a cathode coating in some types of photo tubes. { 'kæl, sē am }

calcium acetate [ORG CHEM] $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ A compound that crystallizes as colorless needles that are soluble in water; formerly used as an important source of acetone and acetic acid; now used as a mordant and as a stabilizer of plastics. { 'kæl, sē am 'æs, æt }

calcium acrylate [ORG CHEM] $(\text{CH}_2\text{CHCOO})_2\text{Ca}$ Free-flowing, water-soluble white powder used for soil stabilization, oil-well sealing, and ion exchange and as a binder for clay products and foundry molds. { 'kæl, sē am 'ækrī, læt }

calcium arsenate [INORG CHEM] $\text{Ca}_3(\text{AsO}_4)_2$ An arsenic compound used as an insecticide to control cotton pests. { 'kæl, sē am 'ārs-ən, æt }

calcium arsenite [INORG CHEM] $\text{Ca}_3(\text{AsO}_3)_2$ White granules that are soluble in water; used as an insecticide. { 'kæl, sē am 'ārs-ən, īt }

calcium bisulfite [INORG CHEM] $\text{Ca}(\text{HSO}_3)_2$ A white powder, used as an antiseptic and in the sulfate pulping process. { 'kæl, sē am bī'sal, fīt }

calcium bromide [INORG CHEM] CaBr_2 A deliquescent salt in the form of colorless hexagonal crystals that are soluble in water and absolute alcohol. { 'kæl, sē am brō, mīd }

calcium carbide [INORG CHEM] CaC_2 An alkaline earth carbide obtained in the pure form as transparent crystals that decompose in water; used to make acetylene gas. { 'kæl, sē am 'kær, bīd }

calcium carbonate [INORG CHEM] CaCO_3 White rhombohedrons or a white powder; occurs naturally as calcite; used in paint manufacture, as a dentifrice, as an anticaking medium for table salt, and in manufacture of rubber tires. { 'kæl, sē am 'kær-bō, nāt }

calcium chlorate [INORG CHEM] $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$ White monoclinic crystals, decomposed by heating. { 'kæl, sē am 'klōr, æt }

calcium chloride [INORG CHEM] CaCl_2 A colorless, deliquescent powder that is soluble in water and ethanol; used as an antifreeze and as an antidust agent. { 'kæl, sē am 'klōr, fīd }

calcium chromate [INORG CHEM] $\text{CaCrO}_4 \cdot 2\text{H}_2\text{O}$ Yellow, monoclinic crystals that are slightly soluble in water; used to make other pigments. { 'kæl, sē am 'krō, māt }

calcium cyanamide [INORG CHEM] CaCN_2 In pure form, colorless rhombohedral crystals, the commercial form being a gray material containing 55-70% CaCN_2 ; used as a fertilizer, weed killer, and deloliant. { 'kæl, sē am 'saī-an-ā, mīd }

calcium cyanide [INORG CHEM] Ca(CN)_2 In pure form, a white powder that gives off hydrogen cyanide in air at normal humidity; prepared commercially in impure black or gray flakes; used as an insecticide and rodenticide. Also known as black cyanide. { 'kæl, sē am 'saī-an-ā, mīd }

calcium cyclamate [ORG CHEM] $\text{C}_{12}\text{H}_{16}\text{O}_6\text{N}_2\text{S}_2\text{Ca} \cdot \text{H}_2\text{O}$ White crystals with a very sweet taste, soluble in water; has been used as a low-calorie sweetening agent. { 'kæl, sē am 'saī-fā, māt }

calcium dihydrogen phosphate See calcium phosphate. { 'kæl, sē am dī hī drī-jən 'fās, fæt }

calcium fluoride [INORG CHEM] CaF_2 Colorless, cubic crystals that are slightly soluble in water and soluble in ammonium salt solutions; used in etching glass and preparing hydrofluoric acid. { 'kæl, sē am 'flūr, fīd }

calcium gluconate [ORG CHEM] $\text{Ca}(\text{C}_6\text{H}_{11}\text{O}_7)_2 \cdot \text{H}_2\text{O}$ White powder that loses water at 120°C ; soluble in hot water but less soluble in cold water; insoluble in acetic acid and alcohol; used in medicine, as a foaming agent, and as a buffer in foods. { 'kæl, sē am 'glū-fā, nāt }

calcium hardness [CHEM] Presence of calcium ions in water, from dissolved carbonates and bicarbonates; treated in boiler water by introducing sodium phosphate. { 'kæl, sē am 'hārd, nes }

calcium hydride [INORG CHEM] CaH_2 In pure form, white crystals that are insoluble in water; used in the production of chromium, titanium, and zirconium in the hydromet process. { 'kæl, sē am 'hīd, rīd }

calcium hydrogen phosphate See calcium phosphate. { 'kæl, sē am hī drī-jən 'fās, fæt }

calcium hydroxide [INORG CHEM] Ca(OH)_2 White crystals, slightly soluble in water; used in cement, mortar, and manufacture of calcium salts. Also known as hydrated lime. { 'kæl, sē am hī drōks, īd }

calcium hypochlorite [INORG CHEM] $\text{Ca(OCl)}_2 \cdot 4\text{H}_2\text{O}$ A white powder, used as a bleaching agent and disinfectant for swimming pools. { 'kæl, sē am hī-pō klōr, īt }

calcium iodide [INORG CHEM] CaI_2 A yellow, hygroscopic powder that is very soluble in water; used in photography. { 'kæl, sē am 'i, dīd }

calcium iodobenzenate [ORG CHEM] $\text{CaIOCC}_6\text{H}_4\text{I}$ A yellowish powder that is soluble in warm chloroform; used in feed additives. { 'kæl, sē am 'i, dī-bē-nāt }

calcium lactate [ORG CHEM] $\text{Ca}(\text{C}_3\text{H}_5\text{O}_2)_2 \cdot 5\text{H}_2\text{O}$ A salt of lactic acid in the form of white

potassium ferrocyanide

crystals; decomposes when heated; used in calico printing and wool dyeing. Also known as red potassium prussiate; red prussiate of potash. {p'tas-e-am 'fer-e-si-a-nid}

potassium ferrocyanide [INORG CHEM] $K_4Fe(CN)_6 \cdot 3H_2O$ Yellow crystals with saline taste; soluble in water; insoluble in alcohol; loses water at 60°C; used in medicine, dry colors, explosives, and as an analytical reagent. Also known as yellow prussiate of potash. {p'tas-e-am 'fer-O'si-a-nid}

potassium fluoride [INORG CHEM] KF or $KF \cdot 2H_2O$ Poisonous, white, deliquescent crystals with saline taste; soluble in water and hydrofluoric acid; insoluble in alcohol; melts at 840°C; used to etch glass and as a preservative and insecticide. {p'tas-e-am 'flu-ri-d}

potassium fluosilicate [INORG CHEM] K_2SiF_6 An odorless, white crystalline compound; slightly soluble in water; used in vitreous frits, synthetic mica, metallurgy, and ceramics. Also known as potassium silicofluoride. {p'tas-e-am 'flu-si-a-nat}

potassium gluconate [ORG CHEM] $KC_6H_{11}O_7$ An odorless, white crystalline compound with salty taste; soluble in water; insoluble in alcohol and benzene; used in medicine. {p'tas-e-am 'glu-ko-nat}

potassium glutamate [ORG CHEM] $KOOC(CH_2)_4CH(NH_2)COOH \cdot H_2O$ White, hygroscopic, water-soluble powder; used as a flavor enhancer and salt substitute. Also known as monopotassium L-glutamate. {p'tas-e-am 'glu-d-a-mat}

potassium glycerophosphate See potassium glycerophosphate. {p'tas-e-am 'gis-e-ro-no-fas-fat}

potassium glycerophosphate [ORG CHEM] $K_2C_3H_5O_5 \cdot H_2PO_4 \cdot 3H_2O$ Pale yellow, syrupy liquid; soluble in alcohol; used in medicine and as a dietary supplement. Also known as potassium glycerophosphate. {p'tas-e-am 'gis-e-ro-fas-fat}

potassium gold chloride [INORG CHEM] $KAuCl_4 \cdot 2H_2O$ Yellow crystals; soluble in water, ether, and alcohol; used in photography and medicine. Also known as gold potassium chloride; potassium aurichloride; potassium chloraurate. {p'tas-e-am 'gold 'klor-id}

potassium gold cyanide [INORG CHEM] $KAu(CN)_4$ A white, water-soluble, crystalline powder; used in medicine and for gold plating. Also known as gold potassium cyanide; potassium cyanogold. {p'tas-e-am 'gold 'si-a-nid}

potassium hydrazide See potassium hydrazide. {p'tas-e-am 'hi-dra-iz}

potassium hydrogen phosphate See potassium phosphate. {p'tas-e-am 'hi-dra-jen 'fas-fat}

potassium hydrogen phthalate See potassium biphthalate. {p'tas-e-am 'hi-dra-jen 'tha-lat}

potassium hydroxide [INORG CHEM] KOH Toxic, corrosive, water-soluble, white solid, melting at 360°C; used to make soap and matches, and as an analytical reagent and chemical intermediate. Also known as caustic potash; potassium hydrate. {p'tas-e-am 'hi-dra-k-sid}

potassium hypochlorite See potassium perchlorate. {p'tas-e-am 'hi-po-'klor-at}

potassium hypophosphite [INORG CHEM] KH_2PO_2 White, opaque crystals or powder, soluble in water and alcohol; used in medicine. {p'tas-e-am 'hi-po-'fas-fat}

potassium iodate [INORG CHEM] KIO_3 Odorless, white crystals; soluble in water; insoluble in alcohol; melts at 560°C; used as an analytical reagent and in medicine. {p'tas-e-am 'i-a-dat}

potassium iodide [INORG CHEM] KI Water- and alcohol-soluble, white crystals with saline taste; melts at 656°C; used in medicine and photography, and as an analytical reagent. {p'tas-e-am 'i-a-did}

potassium linoleate [ORG CHEM] $C_{18}H_{34}O_2$ Light-tan, water-soluble paste; used as an emulsifying agent. {p'tas-e-am 'li-no-le-at}

potassium manganate [INORG CHEM] K_2MnO_4 Water-soluble dark-green crystals,

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potassium platinumchloride

decomposing at 190°C; used as an analytical reagent, bleach, oxidizing agent, disinfectant, mordant for dyeing wool and in photography, printing, and water purification. {p'tas-e-am 'may-ga-nat}

potassium metabisulfite [INORG CHEM] $K_2S_2O_5$ White granules or powder; decomposing at 150-190°C; used as an antiseptic, for whitening, food preservation, and process engraving, and as a source for sulfurous acid. Also known as potassium pyrosulfite. {p'tas-e-am 'med-e-bi-sal-fti}

potassium metarsenite See potassium arsenite. {p'tas-e-am 'med-e-bi-sal-fti}

potassium monophosphate See potassium phosphate. {p'tas-e-am 'myu-e-at}

potassium murate See potassium chloride. {p'tas-e-am 'myu-e-at}

potassium nitrate [INORG CHEM] KNO_3 Flammable, water-soluble, white crystals with saline taste; melts at 337°C; used in pyrotechnics, explosives, and matches, as a fertilizer, and as an analytical reagent. Also known as niter. {p'tas-e-am 'ni-trat}

potassium nitrite [INORG CHEM] KNO_2 White, deliquescent, prisms, melting at 297-450°C; soluble in water; insoluble in alcohol; strong oxidizer; exploding at over 550°C; used as an analytical reagent, in medicine, organic synthesis, pyrotechnics, and explosives. {p'tas-e-am 'ni-tri-t}

potassium oxalate [ORG CHEM] $K_2C_2O_4 \cdot H_2O$ Odorless, efflorescent, water-soluble, colorless crystals; decomposes when heated; used in analytical chemistry and photography and as a bleach and oxalic acid source. {p'tas-e-am 'k-sa-lat}

potassium oxide [INORG CHEM] K_2O Gray, water-soluble crystals; melts at red heat; forms potassium hydroxide in water. {p'tas-e-am 'ik-sid}

potassium perchlorate [INORG CHEM] $K_2ClO_4 \cdot H_2O$ White, granular, water-soluble mass with a melting point of 200-300°C; used in microscopy, photography, and textile printing. {p'tas-e-am 'par-ter-bo-nat}

potassium perchlorate [INORG CHEM] $KClO_4$ Explosive, oxidative, colorless crystals; soluble in water; insoluble in alcohol; decomposes at 400°C; used in explosives, medicine, pyrotechnics, analysis, and as a reagent and oxidizing agent. Also known as potassium perchlorate. {p'tas-e-am 'par-ter-bo-nat}

potassium permanganate [INORG CHEM] $KMnO_4$ Highly oxidative, water-soluble, purple crystals with sweet taste; decomposes at 240°C; and explodes in contact with oxidizable materials; used as a disinfectant and analytical reagent, in dyes, bleaches, and medicines, and as a chemical intermediate. Also known as purple salt. {p'tas-e-am 'par-man-ge-nat}

potassium peroxide [INORG CHEM] K_2O_2 Yellow mass with a melting point of 490°C; decomposes with oxygen evolution in water; used as an oxidizing and bleaching agent. {p'tas-e-am 'per-ik-sid}

potassium peroxydisulfate See potassium persulfate. {p'tas-e-am 'per-ik-se-dif-sal-fat}

potassium persulfate [INORG CHEM] $K_2S_2O_8$ White, water-soluble crystals; decomposing below 100°C; used for bleaching and textile desizing, as an oxidizing agent and antiseptic, and in the manufacture of soap and pharmaceuticals. Also known as potassium peroxodisulfate. {p'tas-e-am 'par-sal-fat}

potassium phosphate [INORG CHEM] Any one of three orthophosphates of potassium. The monobasic form, KH_2PO_4 , consists of colorless, water-soluble crystals melting at 253°C; used in sonar transducers, optical modulators, medicine, baking powders, and nutrient solutions; also known as potassium acid phosphate, potassium dihydrogen phosphate (KDP), potassium dihydrogen phosphate, potassium orthophosphate. The dibasic form, K_2HPO_4 , consists of white, water-soluble crystals; used in medicine, fermentation, and nutrient solutions; also known as potassium hydrogen phosphate, potassium monophosphate. The tribasic form, K_3PO_4 , is a water-soluble, hygroscopic liquid scaps and fertilizers; also known as neutral potassium phosphate, tripotassium orthophosphate. {p'tas-e-am 'fas-fat}

potassium platinumchloride See potassium chloroplatinate. {p'tas-e-am 'plat-an-'klor-id}

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sodium glucoheptonate

water. has a formic acid aroma; melts at 245°C; used in medicine and as a chemical intermediate and reducing agent. [sod-e-am 'for mat]

sodium gluconophosphate [oxoc chem] $C_6H_9O_7Na$ A light tan, crystalline powder, used for cleaning metal, metalizing, paint stripping, and aluminum etching. [sod-e-am 'glu ko-hep-to-nat]

sodium gluconate [oxoc chem] $C_6H_{11}NaO_7$ A water-soluble, yellow to white, crystalline powder, produced by fermentation; used in food and pharmaceutical industries, and as a metal cleaner. Also known as gluconic acid sodium salt. [sod-e-am 'glu ko-nat]

sodium glutamate [oxoc chem] $COO(CH_2)_2CH(NH_2)COONa$ A salt of an amino acid, a white powder, soluble in water and alcohol; used as a taste enhancer. Also known as monosodium glutamate (MSG). [sod-e-am 'glu d-a-mat]

sodium gold chloride [oxoc chem] $NaAuCl_4 \cdot 2H_2O$ Yellow crystals, soluble in water and alcohol; used in photography, fine glass staining, porcelain decorating, and medicine. Also known as gold salt; gold sodium chloride. [sod-e-am 'gold 'klorid]

sodium gold cyanide [oxoc chem] $NaAu(CN)_2$ A yellow, water-soluble powder, used for gold plating, radar and electric parts, jewelry, and tableware. Also known as gold sodium cyanide. [sod-e-am 'gold 's'i-a-nid]

sodium halide [oxoc chem] A compound of sodium with a halogen; for example, sodium bromide ($NaBr$), sodium chloride ($NaCl$), sodium iodide (NaI), and sodium fluoride (NaF). [sod-e-am 'ha, lid]

sodium halometalate [oxoc chem] A compound of sodium with halogen and a metal; for example, sodium platinochloride, $Na_2PtCl_6 \cdot 6H_2O$. [sod-e-am 'ha-l-o-met-a-lat]

sodium hexylene glycol monoborate [oxoc chem] $C_6H_{12}O_7BNa$ An amorphous, white solid with a melting point of 426°C; used as a corrosion inhibitor, flame retardant, and lubricating-oil additive. [sod-e-am 'hek-sa-len 'glu kol mha-n-o-bor-at]

sodium hydrazide [oxoc chem] $NaNH_2$ A white powder, decomposed by water, and igniting in moist air; used to make sodium borohydride and as a drying agent and a reagent. [sod-e-am 'hi-drazid]

sodium hydrogen phosphite [oxoc chem] $NaH_2PO_3 \cdot H_2O$ Hygroscopic, transparent, water-soluble crystals; used as a purgative, reagent, and buffer. [sod-e-am 'hi-dra-jan 'fa-sal]

sodium hydrogen sulfide See sodium hydrosulfide. [sod-e-am 'hi-dra-jan 'sa, lid]

sodium hydrosulfide [oxoc chem] $NaSH \cdot 2H_2O$ Toxic, colorless, water-soluble needles, melting at 55°C; used in pulping of paper, processing dyes, hide dehairing, and bleaching. Also known as sodium bisulfide; sodium hydrogen sulfide; sodium sulfhydrate. [sod-e-am 'hi-dra-sal, lid]

sodium hyposulfite [oxoc chem] $Na_2S_2O_4$ A fire-hazardous, lemon to whitish-gray powder; soluble in water, insoluble in alcohol; melts at 52°C; used as a chemical intermediate and catalyst and in ore flotation. Also known as sodium dithionite. [sod-e-am 'hi-dra-sal, lid]

sodium hydroxide [oxoc chem] $NaOH$ White, deliquescent crystals; absorbs carbon dioxide and water from air, soluble in water, alcohol, and glycerol; melts at 318°C; used as an analytical reagent and chemical intermediate, in rubber retulding and petroleum refining, and in detergents. Also known as sodium hydrate. [sod-e-am 'hi-droksaid]

sodium hypochlorite [oxoc chem] $NaOCl$ Air-unstable, pale-green crystals with sweet aroma; soluble in cold water, decomposes in hot water; used as a bleaching agent for paper pulp and textiles, as a chemical intermediate, and in medicine. [sod-e-am 'hi-po-klorid]

sodium hypophosphite [oxoc chem] $NaH_2PO_2 \cdot H_2O$ Colorless, pearly, water-soluble crystalline plates or a white, granular powder; used in medicine and electroless nickel plating of plastic and metal. [sod-e-am 'hi-po-fa-sal, lid]

sodium hyposulfite See sodium thiosulfate. [sod-e-am 'hi-po-sal, lid]

sodium nitrate

sodium iodate [oxoc chem] $NaIO_3$ A white, water- and acetone-soluble powder; used as a disinfectant and in medicine. [sod-e-am 'i-a-dat]

sodium iodide [oxoc chem] NaI A white, air-sensitive powder, deliquescent, with bitter taste, soluble in water, alcohol, and glycerol; melts at 653°C; used in photography and in medicine and as an analytical reagent. [sod-e-am 'i-a-did]

sodium isopropylxanthate [oxoc chem] C_3H_7ONaS Light yellow, crystalline compound that decomposes at 150°C; soluble in water; used as a postemergence herbicide and as a flotation agent for ores. [sod-e-am 'i-sap-to, pol-zan, that]

sodium lactate [oxoc chem] $CH_3CHOHCOONa$ A water-soluble, hygroscopic, yellow to colorless, syrupy liquid, solidifies at 17°C; used in medicine, as a corrosion inhibitor in antifreeze, and a hygroscopic agent. [sod-e-am 'laktat]

sodium lauryl sulfate [oxoc chem] $(C_{12}H_{25}O_2)_2Na$ A water-soluble salt, produced as a white or cream powder, crystals, or flakes; used in the textile industry as a wetting agent and detergent. Also known as dodecyl sodium sulfate. [sod-e-am 'lor-al 'sal, lat]

sodium lead hyposulfate See lead sodium thiosulfate. [sod-e-am 'led 'hi-po-sal, lat]

sodium lead thiosulfate See lead sodium thiosulfate. [sod-e-am 'led 'hi-po-sal, lat]

sodium metaborate [oxoc chem] $NaBO_2$ Water-soluble, white crystals, melting at 966°C; the aqueous solution is alkaline, made by fusing sodium carbonate with borax, used as an herbicide. [sod-e-am 'met-a-bor, lat]

sodium metaphosphate [oxoc chem] $(NaPO_3)_x$ Sodium phosphate groupings; cyclic forms range from $x = 3$ for the trimetaphosphate, to $x = 10$ for the decametaphosphate; sodium hexametaphosphate with $x = 10$ to 20 is probably a polymer; used for dental polishing, building detergents, and water softening, and as a sequestant, emulsifier, and food additive. [sod-e-am 'met-a-fa-sal, lat]

sodium metasilicate See sodium silicate. [sod-e-am 'met-a-sil-a, lat]

sodium metavanadate [oxoc chem] $NaVO_3$ Colorless crystals of a pale green, crystalline powder with a melting point of 630°C; soluble in water; used in inks, for dyeing, and photography, and as a corrosion inhibitor in gas scrubbers. [sod-e-am 'met-a-van-a-dat]

sodium methiodol [oxoc chem] ICH_3SO_3Na A white, crystalline powder, soluble in water and methanol; used in medicine as a radiopaque medium. [sod-e-am 'meth-i-a-dol]

sodium methoxide [oxoc chem] CH_3ONa A salt produced as a free-flowing powder, soluble in methanol and ethanol; used as an intermediate in organic synthesis. Also known as sodium methylate. [sod-e-am 'meth-a-dol]

sodium methylate See sodium methoxide. [sod-e-am 'meth-a-dol]

sodium N-methylthiocarbamate dihydrate [oxoc chem] $CH_3NHC(S)Na \cdot 2H_2O$ A white, water-soluble, crystalline solid; used as a fungicide, insecticide, nematocide, and weed killer. [sod-e-am 'jen 'meth-a-l-di-hi-dra-ta, ba, mat 'di-hi-drat]

sodium molybdate [oxoc chem] Na_2MoO_4 Water-soluble crystals, melting at 687°C; used as an analytical reagent, corrosion inhibitor, catalyst, and zinc-plating brightening agent, and in medicine. [sod-e-am 'molyb-dat]

sodium 12-molybdophosphate [oxoc chem] $Na_{12}P_{12}O_{40}$ Yellow, water-soluble crystals; used in neutron microscopy and photography, and as a water-resisting agent in plastic adhesives and cements. [sod-e-am 'twelv molyb-do-fa-sal, lat]

sodium monoxide [oxoc chem] Na_2O A strong basic white powder soluble in molten caustic soda; forms sodium hydroxide in water; used as a dehydrating and polymerization agent. Also known as sodium oxide. [sod-e-am 'm-nik-sid]

sodium naphthalenesulfonate [oxoc chem] $C_{10}H_7SO_3Na$ Yellow, water-soluble crystalline plates or white scales; used as a liquefying agent in animal glue. [sod-e-am 'na-f-thal-sal, fa, nat]

sodium naphthionate [oxoc chem] $NaC_{10}H_7(NH_2)SO_3 \cdot 4H_2O$ White, light-sensitive crystals, soluble in water and insoluble in ether; used in analysis (Riegler's reagent) for nitrous acid. [sod-e-am 'na-f-thi-a-nat]

sodium nitrate [oxoc chem] $NaNO_3$ Fire-hazardous, transparent, colorless crystals with bitter taste; soluble in glycerol and water; melts at 308°C; decomposes when